

Before the
Federal Communications Commission
Washington DC 20554

In the Matter of)	
)	
Inquiry Regarding Carrier Current)	ET Docket No. 03-104
Systems, Including Broadband over)	
Power Line Systems)	

Comments of HomePlug Powerline Alliance

Intellon Corporation (Intellon) is pleased to submit these Comments in response to the Notice of Inquiry (NOI) regarding Carrier Current Systems, including Broadband over Power Line systems. (ET Docket 03-104).

Introduction

Intellon Corporation is a fabless semiconductor manufacturer that designs and sells integrated circuits that allow networking and other communications over powerlines. Intellon invented the technology that forms the basis for the HomePlug 1.0 powerline networking specification as well as the technology that forms the basis of the CEBus powerline communications standard, EIA 600. HomePlug and CEBus devices communicate through a home's existing electric power wires, allowing every power outlet to also serve as a connection to an in-home data network. The Commission regulates these devices as unlicensed carrier current systems under Part 15 of its rules. The requirements in Part 15 have proven effective in protecting against interference to licensed services, and therefore there is no demonstrated need for additional or changed

rules. Stability and predictability in regulation encourages the long-term effort and resources needed to develop and deliver to consumers new and innovative products. Therefore, insofar as In-House BPL is concerned, the Commission should decline further rulemaking as being unnecessary to fully protect licensed services. The costs and uncertainties of additional rulemaking could effectively destroy the emerging BPL industry at the very time that it is demonstrating its ability to compete with such existing technologies as in-home WiFi and cable and DSL broadband access systems. Allowing BPL to develop without the threat of additional rulemaking would remove uncertainty and foster additional innovation and competition in the marketplace, improving the level and reducing the cost of delivering broadband services and digital entertainment to the American public.

Background

HomePlug devices communicate through a home's electric power wires, allowing each power outlet to double as a network connection. The result is a data and home entertainment network that can be used to transmit digital information at up to 14 Mbps between outlets. The presence of this information on the electrical wiring has no effect on the electric service in the home. At present, 17 manufacturers manufacture 58 different products that comply with the HomePlug standard. All of the devices individually interoperate and provide networking benefits to thousands of users in the United States and other countries. Intellon is the worldwide market leader in supplying integrated circuits and associated reference designs for these products.

HomePlug 1.0 devices use Orthogonal Frequency Division Multiplexing (“OFDM”). As the Commission recognized in its NOI, OFDM uses a number of closely spaced carriers to create a wideband signal, in HomePlug’s case between 4.5 MHz and 21 MHz. The payload data stream is divided into smaller subsets, and individual carriers transport a subset of the data, which is then reassembled into its original stream at the receiver modem. As the powerline channel can be hostile to effective communications, HomePlug devices regularly estimate channel conditions to continually adjust the optimal use of the carriers for data transmission.

The powerline medium is shared among devices by a carrier sense multiple access (CSMA) technique with extensions to avoid channel collisions. This system ensures the modems wait for the medium to be clear before transmitting, and also ensures that only one unit transmits at any given instant.

Current generation devices complying with the HomePlug 1.0 specification provide up to 14 Mbps raw bit rate on the powerline, with application level throughput exceeding 5 Mbps in over 80% of outlet pairs.

The HomePlug Powerline Alliance has begun the process of developing its next-generation standard, called HomePlug AV. HomePlug AV is being designed to support distribution of data and multi-stream entertainment throughout the home, including standard and high definition television. Application layer throughput of over 50 Mbps is targeted for this application, and a selection process among multiple expected technology

proposals is expected to take place during the fall of 2003. An important aspect of the selection process will be ensuring that effective communications is maintained within the FCC's existing Part 15 limits applicable to carrier current systems.

Benefits of In-House BPL

Market demand for in-home networking is growing rapidly. This demand is being driven by a number of factors, including the need for convenient, cost-effective shared broadband Internet access, personal computer file sharing, online gaming and digital audio and video entertainment applications. Industry participants are increasingly recognizing that the best way of achieving reliable whole house networking is to use a mix of Ethernet, wireless and powerline that best fits the needs of the particular home or small business. For example, where mobility is required and Ethernet is not an option, powerline offers a simple and cost-effective method of extending the reach or optimizing the placement of wireless access points, using powerline as the backbone (just as Ethernet is used in enterprise settings) and wireless for the mobility requirements. Once the powerline backbone has been established, connecting new personal computers and consumer entertainment devices is as easy as plugging them into a power outlet. Powerline can also be used to expand Ethernet networks without the cost of running new wires.

As a backbone solution for whole house connectivity where mobility is not required and Ethernet is not available, powerline has significant advantages. It provides better coverage and performance reliability than WiFi in many homes, without the range, dead spots and interference problems of WiFi. It also offers quality of service (QoS).

Powerline's reliability, coverage and QoS advantages are particularly beneficial in streaming audio and video, and in other entertainment applications where reliable, robust and consistent performance are especially critical. Powerline's advantages over WiFi in consumer entertainment applications should become even more pronounced with higher bandwidth applications, such as multiple video streams.

Powerline is easy to set up and use, resulting in far fewer customer returns than WiFi products. Any device (such as a gaming console or an audio product) with an Ethernet port or interface can be connected over the powerline by simply plugging the Ethernet cable from the device into an Ethernet-to-powerline adapter plugged into a convenient electrical outlet. HomePlug powerline products provide better security out of the box than 802.11b. Using 56-bit Digital Encryption Standard (DES) security, HomePlug powerline encryption is enabled with a common password when retail products are shipped. Users can easily change this password to create their own private network.

Powerline also has cost benefits over wireless at production volumes, as there is no need for a radio and antenna.

Powerline also has advantages over existing wired solutions such as Ethernet, phone line (HPNA) and coax. Because it requires no new wires, powerline avoids the cost of pulling cables and repairing wall damage. Powerline also offers greater flexibility and convenience because of the larger number of power outlets in most homes.

Additional Regulation of BPL Is Not Needed

BPL devices are regulated as unlicensed carrier current systems under Part 15 of the Commission's rules. Devices subject to Part 15 requirements have become ubiquitous throughout our society and the emissions limits imposed under Part 15 have proven effective at protecting against harmful interference. These limits have proved useful at protecting sensitive licensed services throughout the spectrum even with the extraordinary growth in the numbers of devices. The same limits govern emissions from BPL systems and have proven to be adequate to protect against interference to licensed services.

Intellon does not believe there is any need for additional regulation of BPL by the Commission. The regulations that exist today in Part 15 have protected against interference with licensed services while providing the freedom for innovation that has made BPL systems such as HomePlug possible. A similar approach in the regulation of unlicensed devices has repeatedly proven beneficial for the development of new technical approaches that markedly improve consumers' lives and the American economy. Now familiar innovations such as fax machines, modems, spread spectrum cordless phones, Wi-Fi and ultra-wideband all have their roots in Commission proceedings that have not mandated technical approaches or standards, but instead provided an adequate framework for protection to licensed services.

Therefore, there is no need for the Commission to mandate frequency bands for In-House or Access BPL. This is a role for industry consortia and standards groups, and

competing approaches can have value within the marketplace. Some providers may wish to provide integrated systems that bridge the differences between the two categories. The Commission should not stifle innovation through unnecessary controls on a growing industry.

Regulation Should Address Interference Potential, Not Technology

Licensed spectral users clearly hold a legitimate expectation to protection from harmful interference. Regulation of BPL should focus on addressing interference potential rather than limiting technology that may restrict future opportunities for innovation. Devices inside the home may well have different interference potential than devices mounted outside on the electricity distribution infrastructure, and regulations should treat these situations accordingly.

In today's Part 15 regulations, the Commission provides an incentive for responsible manufacturers to avoid interference to licensed services. Part 15.5 clearly states that unintentional emitters such as carrier current systems must be operated in a non-interference mode and that upon Commission notification of resulting interference, all operation must be ceased until the interference has been corrected. This provides a powerful incentive for responsible manufacturers to avoid potential interference and thereby avoid the substantial cost and damage to business reputation of correcting an interfering system.

The Commission sought comment in the NOI on potential for interference between BPL and DSL or cable modem service. No such interference exists between

HomePlug and these services. In fact, HomePlug developers specifically aim to provide HomePlug products for distributing broadband access throughout homes served with DSL and cable modem services. HomePlug and DSL use different frequency ranges, and cable modems use shielded cables, and this ensures there will be no interference between HomePlug devices and DSL or cable modems.

The FCC asked in the NOI about the impact of high-pass filters on potential interference. HomePlug devices do not rely on the transformer or external filters to provide any interference mitigation.

Measurement Procedures

Interference from BPL is largely a radiated phenomenon and not a conducted one. Although BPL systems use electrical wiring as a transmission medium, unintentional radiation is created by these systems. The Commission should continue to address this radiation from the emissions perspective as it does today, because radiated emissions are more likely to impact licensed services than conducted emissions. As such, controlling conducted emissions offers no potential public benefit as it does not serve to protect the licensed spectral users. If any conducted emissions standard is defined, this standard should be based on sound science that demonstrates the relationship between conducted and radiated emissions. Maintaining the approach of controlling radiated emissions would retain the scheme that has proved so successful in other digital devices.

Stability and predictability in regulation encourages the long-term effort and resources needed to develop and bring products to the marketplace. Part 15 of the FCC's

rules provide a mechanism for BPL systems to verify that they meet the Commission's emissions regulations. The current measurement procedures for ensuring compliance with Part 15 rules were developed through cooperation between the Commission staff and leading companies in the BPL industry. As the Commission recognized in its NOI, any changes made to these rules must not disrupt the commercial distribution of these devices. HomePlug devices are now active in thousands of homes in the United States, Europe and Asia with no reports of harmful interference. Any refinement of test procedures the Commission may consider should aim not only to control potential interference, but also to allow BPL to continue to grow.

BPL systems operate like other digital devices in that they use wires as a transmission medium for signals, and the unshielded and variable nature of these wires provides an opportunity for these wires to potentially radiate. As such, BPL manufacturers have shouldered the burden of conducting tests in actual field environments pursuant to the FCC's requirements in Part 15 to ensure that their devices meet emissions level requirements.

Although efforts are underway in industry and standards groups to find a conducted emissions proxy for radiated emissions testing, to date these efforts have concluded that existing conducted emission test methods do not adequately predict the emissions from actual BPL installations. Some studies have suggested that radiation prediction from simple conducted emissions tests may be a futile effort altogether. Before seeking to replace radiated emissions test with a conducted emissions proxy, the

Commission should ensure such a proxy is based on sound science to avoid an arbitrary standard that will not enhance the public interest.

The Commission sought input on equipment authorization procedures. In-House BPL systems that attach to the internal home wiring should continue to be subject to either Verification or Declaration of Conformity. This process leverages from the experience gained through approval of other Class B digital devices and is well understood in the industry. No other unintentional radiator requires certification (except radar detectors due to their unique interference potential).

Conclusion

BPL technology is an important new innovation that provides substantial benefits to consumers for sharing and distributing digital information, including Internet access and home entertainment applications. In Part 15 of its rules, the Commission has succeeded in fostering such innovation while preventing interference between unlicensed devices and licensed services. No need has been demonstrated that the Commission should now change its rules governing In-House BPL devices. Therefore, the Commission should decline further rulemaking at this time. As noted above, the costs and uncertainties of additional rulemaking could effectively destroy the emerging BPL industry at the very time that it is demonstrating its ability to compete with such existing technologies as in-home WiFi and cable and DSL broadband access systems. Allowing BPL to develop without the threat of additional rulemaking would remove uncertainty and foster additional innovation and competition in the marketplace, improving the level

and reducing the cost of delivering broadband services and digital entertainment to the American public.

Respectfully Submitted,

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